CLAIMS:

What is claimed is:

1. A method for performing OTDM, said method comprising the following steps:

a) generating n bit streams of approximately B Gb/s from respectively n tunable laser beams having respectively wavelengths of $\lambda 1$, $\lambda 2$, … and λn;

b) generating from said n bit streams n group velocity dispersed bit streams by introducing group velocity dispersion into said n bit streams;

c) combining said n group velocity dispersed bit streams into a composite bit stream of approximately nB Gb/s; and

d) in response to misalignment of bits within said composite bit stream, tuning said $\lambda 1$, $\lambda 2$, … and λn to create the proper OTDM time differential between consecutive bits within said composite bit stream.

2. The method of Claim 1, further comprising the following steps:

e) generating a single-wavelength composite bit stream of approximately wavelength λv and nB Gb/s by operating on said composite bit stream with a wavelength converter; and

f) in response to misalignment of bits within said single-wavelength composite bit stream, tuning said $\lambda 1$, $\lambda 2$, … and λn to create the proper OTDM time differential between consecutive bits within said single-wavelength composite bit stream.

3. An OTDM transmitter, comprising:

a) n channels of bit streams D1, D2, … and Dn having respectively wavelengths of λ1, λ2, … and λn, wherein for j = 1 to n, the j-th channel comprises:

j1) a tunable laser source Sj providing a bit stream Bj of approximately B Gb/s; and

j2) a group velocity dispersive element Ej coupled to said Sj, introducing group velocity dispersion into said Bj to generate said Dj;

b) a combiner coupled to said n channels and adapted to optically combine said D1, D2, …. and Dn into a composite bit stream of approximately nB Gb/s; and

c) a wavelength converter coupled to said combiner and adapted to convert said composite bit stream into a single-wavelength composite bit stream of approximately nB Gb/s to be transmitted through an optical link, wherein OTDM time differential can be created between consecutive bits of said single-wavelength composite bit stream by tuning λ1, λ2, … and λn.

4. A method for performing OTDM transmission, said method comprising the steps of:

a) generating n bit streams of approximately B Gb/s from respectively n tunable laser beams having respectively initial wavelengths of λ1, λ2, … and λn;

b) generating n group velocity dispersed bit streams by introducing group velocity dispersion into said n bit streams;

c) combining said n group velocity dispersed bit streams into a composite bit stream of approximately nB Gb/s;

d) generating a single-wavelength composite bit stream of wavelength λv by wavelength converting said composite bit stream with a wavelength converter;

e) in response to misalignment of bits within said single-wavelength composite bit stream, tuning said λ1, λ2, … and λn to create the proper OTDM time differential between consecutive bits within said single-wavelength composite bit stream; and

f) transmitting said single-wavelength composite bit stream by launching said single-wavelength composite bit stream into an optical transmission link.

5. A WDM system, comprising:

a) m OTDM channels, wherein for k = 1 to m, the k-th OTDM channel comprises:

k1) n channels Vk1, Vk2, … and Vkn providing respectively bit streams Dk1, Dk2, … and Dkn having respectively wavelengths of λk1, λk2, … and λkn, wherein for j = 1 to n, the j-th channel Vkj comprises:

kj1) a tunable laser source Skj providing a bit stream Bkj of approximately B Gb/s; and

kj2) a group velocity dispersive element Ekj coupled to said Skj, introducing group velocity dispersion into said Bkj to generate said Dkj;

k2) a combiner coupled to said n channels and adapted to optically combine said n bit streams into a composite bit stream Uk;

k3) a wavelength converter coupled to said combiner and adapted to convert said composite bit stream into a single-wavelength composite bit stream Ak of

wavelength λvk, wherein the proper OTDM time differential can be created between consecutive bits of said Ak by tuning λk1, λk2, … and λkn; and

b) a WDM multiplexer coupled to said m OTDM channels, with said WDM multiplexer adapted to generate a composite optical signal with a data rate of approximately mnB Gb/s.

6. An OTDM subsystem for performing optical time-division-multiplexing, said OTDM subsystem comprising:

a) n channels of bit streams D1, D2, … and Dn having respectively wavelengths of λ1, λ2, … and λn, wherein for j = 1 to n, the j-th channel comprises:

j1) a tunable laser source Sj providing a bit stream Bj of approximately B Gb/s; and

j2) a group velocity dispersive element Ej coupled to said Sj, introducing group velocity dispersion into said Bj to generate said Dj;

b) a combiner coupled to said N channels and adapted to optically combine said said D1, D2, …. and Dn into a composite bit stream of approximately nB Gb/s, wherein OTDM time differential can be created between consecutive bits of said composite bit stream by tuning λ1, λ2, … and λn.

7. The Claims of 2-6, wherein return-to-zero (RZ) format is used in generating bit streams.

8. The Claims of 2-6, wherein said B Gb/s is 10 Gb/s, and wherein said n is 4.

9. The Claims of 2-6, wherein said B Gb/s is 40 Gb/s, and wherein said n is 4.

10. The Claims of 2-5, wherein said wavelength converter is a vertical lasing semiconductor optical amplifier (VLSOA), and wherein said single wavelength is generated from the vertical lasing of said VLSOA.

11. The Claims of 2-5, wherein said wavelength converter uses four-wave mixing.

12. The Claims of 2-5, wherein said wavelength converter is a MZ-SOA.

13. The Claims of 2-5, wherein said wavelength converter is a SOA.

14. The method of Claim 1, wherein said n bit streams are generated by modulating respectively n CW tunable laser sources.

15. The method of Claim 1, wherein said n bit streams are generated respectively by n directly modulated tunable laser sources.

16. The OTDM transmitter of Claim 3, wherein for said j=1 to n, said Sj in said j-th channel is a CW tunable laser that is coupled to a modulator Mj, said Mj modulating a laser beam Lj generated by said Sj into said Bj.

17. The OTDM transmitter of Claim 3, wherein for said j=1 to n, said Sj in said j-th channel is a tunable laser that is directly modulated.

18. The method of Claim 4, wherein said n bit streams are generated by modulating respectively n CW tunable laser sources.

19. The method of Claim 4, wherein said n bit streams are generated respectively by n directly modulated tunable laser sources.

20. The WDM system of Claim 5, wherein for k=1 to m and j = 1 to n, said tunable laser source Skj in said j-th channel Vkj is a tunable CW laser source that is coupled to a modulator Mkj, said Mkj modulating a laser beam Lkj produced from said Skj into said stream Bkj.

21. The WDM system of Claim 5, wherein for k=1 to m and j = 1 to n, said tunable laser source Skj in said j-th channel Vkj is a tunable laser that is directly modulated.

22. The OTDM subsystem of Claim 6, wherein for said j=1 to n, said Sj in said j-th channel is a CW tunable laser that is coupled to a modulator Mj, said Mj modulating a laser beam Lj generated by said Sj into said Bj.

23. The OTDM subsystem of Claim 6, wherein for said j=1 to n, said Sj in said j-th channel is a tunable laser that is directly modulated.